

Figure 1

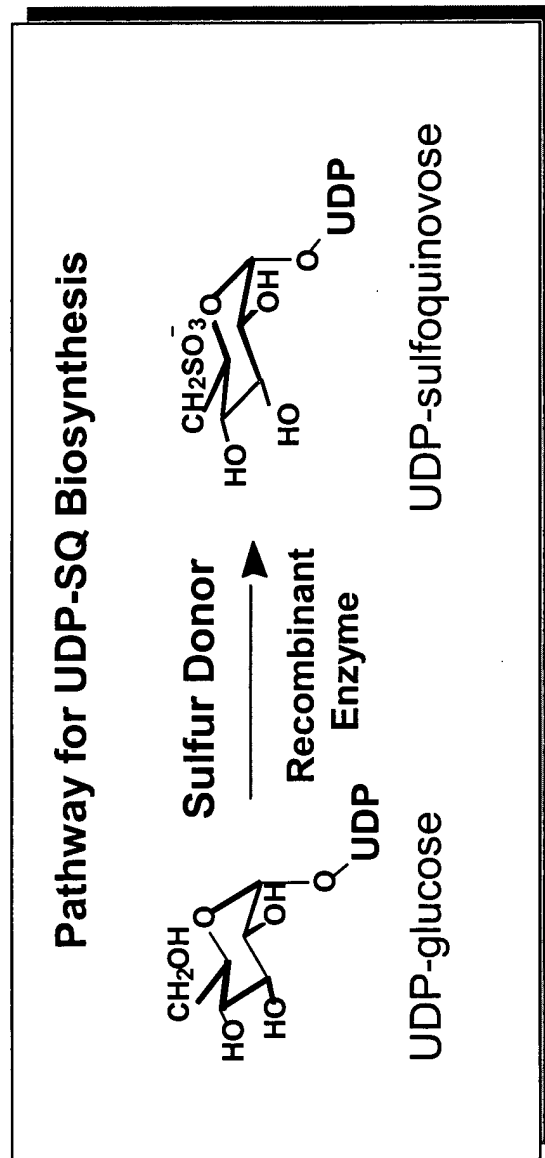


Figure 2

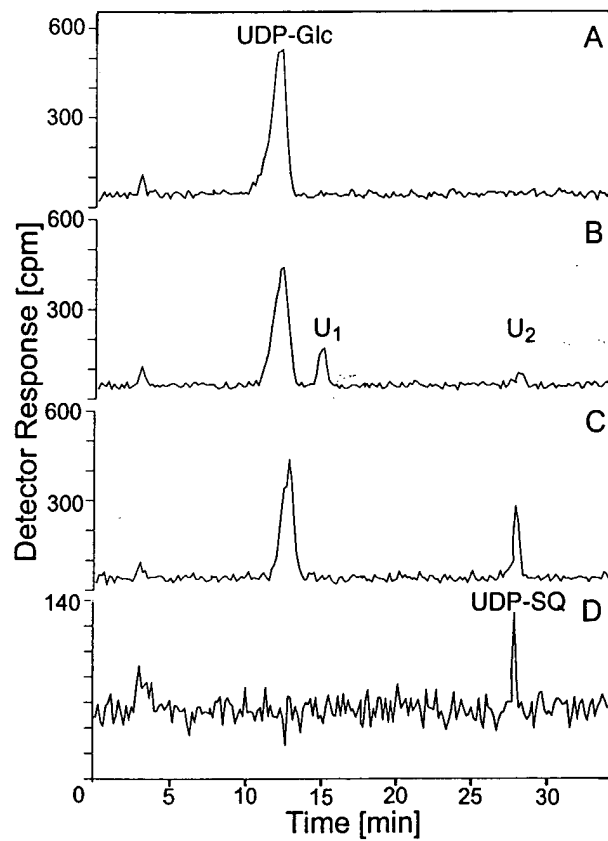
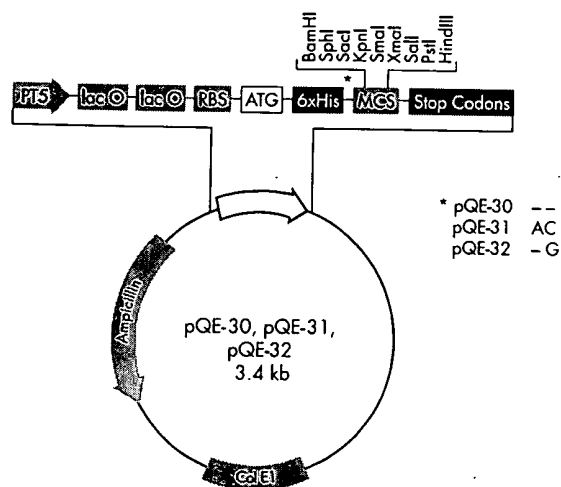


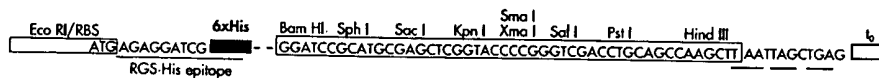
Figure 3

pQE-30, pQE-31, and pQE-32 Vectors

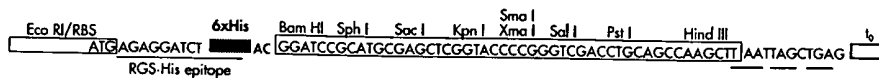
Positions of elements in bases	pQE-30	pQE-31	pQE-32
Vector size (bp)	3462	3464	3463
Start of numbering at <i>Xho</i> I (CTCGAG)	1-6	1-6	1-6
T5 promoter/lac operator element	7-87	7-87	7-87
T5 transcription start	61	61	61
6xHis-tag coding sequence	127-144	127-144	127-144
Multiple cloning site	145-192	147-194	146-193
Lambda <i>t</i> ₀ transcriptional termination region	208-302	210-304	209-303
<i>rrnB</i> T1 transcriptional termination region	1064-1162	1066-1164	1065-1163
ColE1 origin of replication	1639	1641	1640
β -lactamase coding sequence	3257-2397	3259-2399	3258-2398



pQE-30



pQE-31



pQE-32

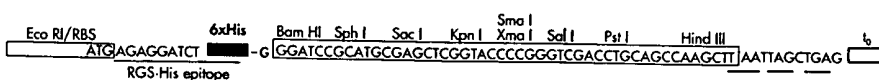


Figure 4

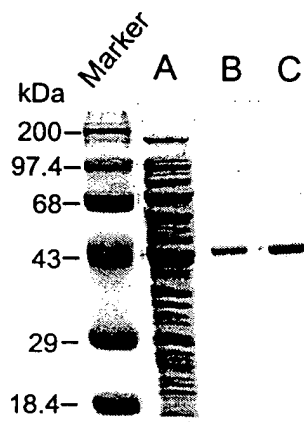
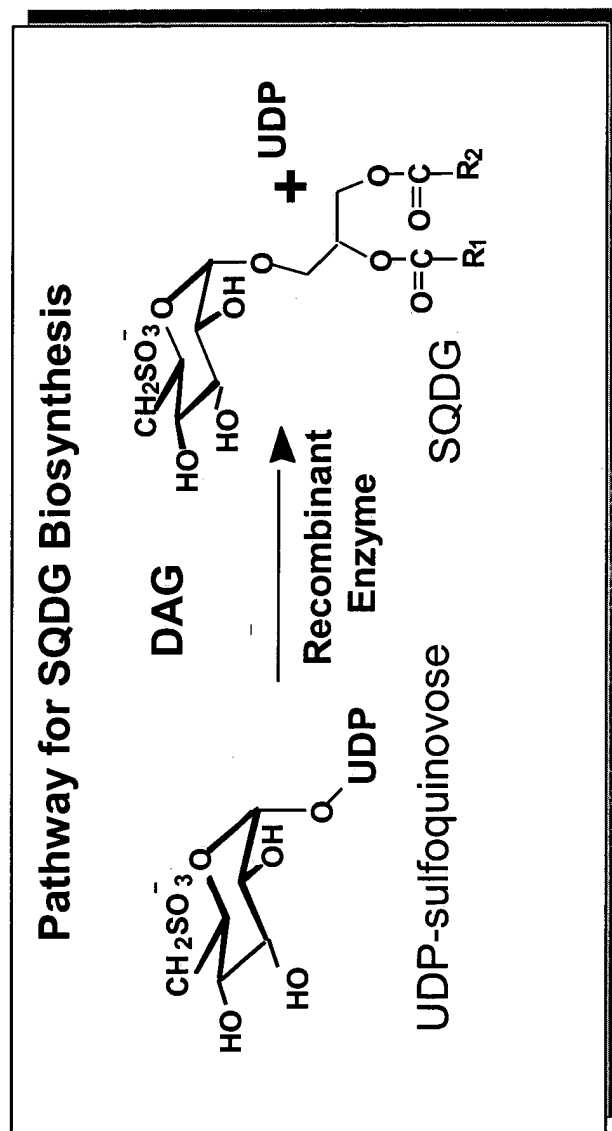


Figure 5



pACYC184

4,244 base pairs
GenBank Accession #: X06403

Figure 6

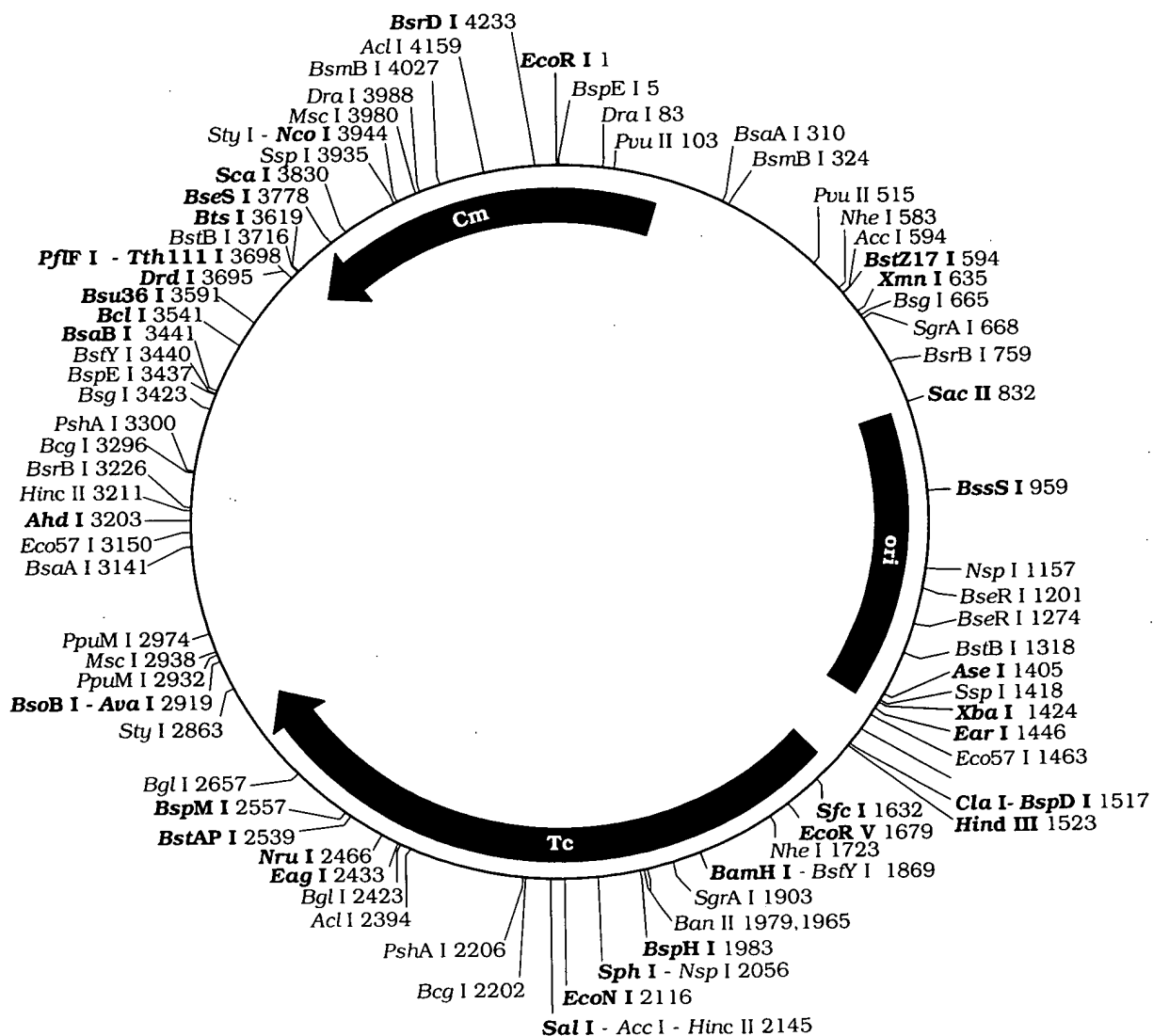
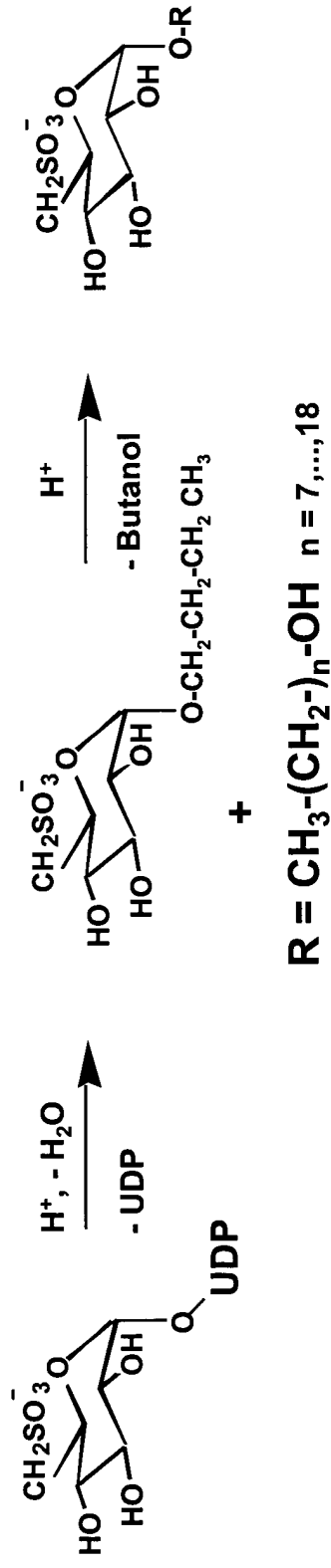


Figure 7

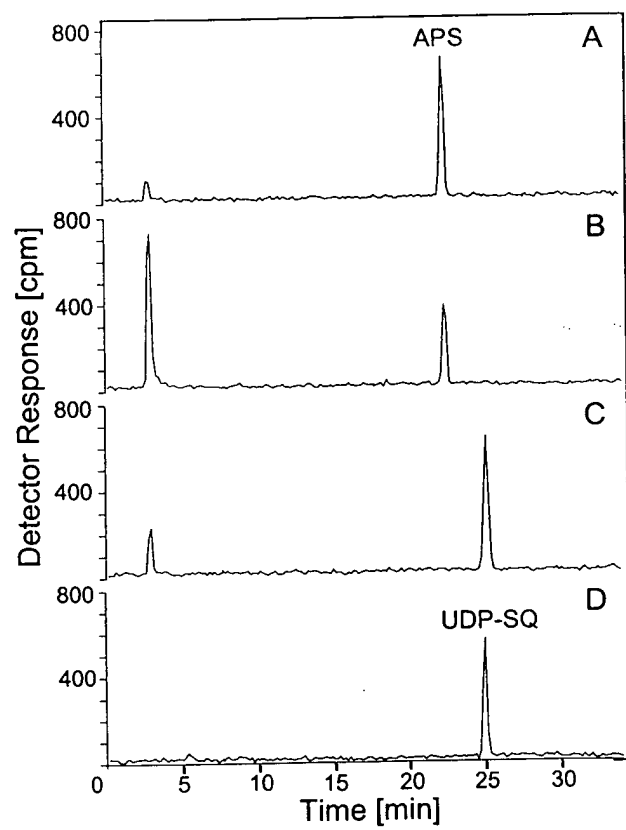


UDP-Sulfoquinovose

Butyl-Sulfoquinovoside

Alkyl-Sulfoquinovoside

Figure 8



008011 02050260

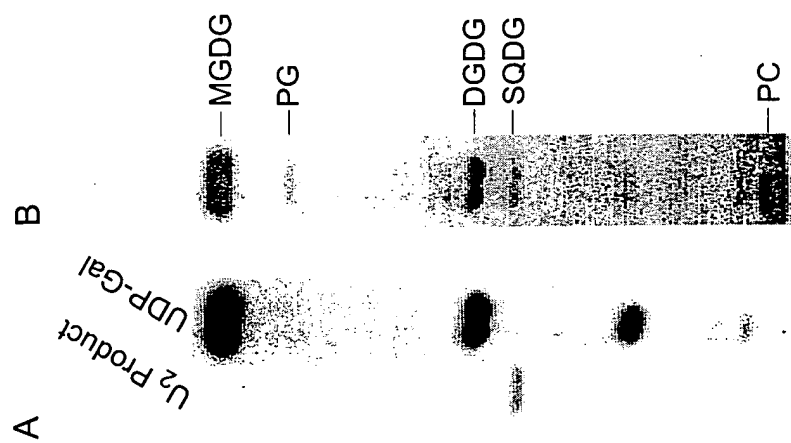


Figure 9

Figure 10

SQDX

1
2-61
62-121
122-181
182-241
242-301
302-361
362-421
422-481
482-541
542-601
602-661
662-721
722-781
782-841
842-901
902-961
962-1021
1022-1081
1082-1134

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aggactacta	ctgcgagggtg	ttggcagatg	gttgcttacc	cttagcggcc	tga

Figure 11

AtSQDX-1

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118-177	tatctttgtc	gttgctgctc	tccaatcata	tttctcggtc	tcttctcttg	ccgcttttcc
178-237	aatgatctct	cttgttttcàc	ggtcgtgcag	taaagttctc	agttttgtca	cgcaatcttc
238-297	aacatctcca	gggttgaaca	aaaatccggt	ttttccctcc	tgatgaaaac	atcagaatca
298-357	gaaaaccaca	agctcaatat	aggttgaccc	ataagaacaa	tcaatgcaag	atcattttgt
358-417	gtaccagtct	atgattgaat	aaagtttcag	ttcgggttaca	gctcgtttat	aagaaaattg
418-477	gcagaaattg	ttttttcaac	catttcgggt	cggttgatat	gctcatcaat	atgggtttggc
478-537	agttaattgt	aattcagata	attcactgac	ctgatcttca	gggattatat	cagggattcc
538-597	accggcacgg	gccgcgacga	caggaagtcc	tgaagacatt	gcttcaagaa	ccacaaggcc
598-657	aagtgtctcc	gactctgatg	gcatacacia	cacatctcca	cttgcgtaag	cttgtgagag
658-717	ttcatcgctt	tgtaacggtc	cagtgaaaac	cgctggcatt	ccggtaaaca	acttctcaag
718-777	atcctctctt	taagaaaacg	aaacagataa	acaaaattac	aatggtgttg	actagaaatc
778-837	ttcagataac	aatatggcca	atctttaaca	aaactagtac	ttgtatggtc	catctccaat
838-897	gaaagcaatc	cgagcttcag	gtaatttgct	cattacactg	cacacaaatt	tctcaatatc
898-957	aaaattcgat	acaccactta	aaagaagtga	gtccagttta	tacaaaattc	taacctcttt
958-1017	aaaagctcca	aactcttttc	tacgccaatg	cgacctacat	gaatcactag	tggcttttct
1018-1077	ggttcgccat	tactgttaat	tacaaaatat	taaacatcaa	gattagcgtg	gaaagtatca
1078-1137	ttgttttttaa	tgcatataaa	agaaacgtat	attctattct	tgctcagtc	ttatacgcat
1138-1197	ttcttgagaa	cggaaacggg	gattgaagct	ttctgaatcg	acaccttat	tccaaagtcg
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1258-1317	tagagcttgt	acaaaaatgt	aatgtatgat	ctttcttcac	ctgcagttgc	accagctgct
1318-1377	ataagatctt	ttccaatggc	agcagaagga	actaatgtaa	gatcagccgc	tctgtgaagg
1378-1437	aacctgata	aaagcatatt	caagtttagt	ttcatattat	acatacacaat	aaaccagaaa
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1738-1797	tctccagttc	actggtcttg	ctaagtgttt	agtaatgtga	attcttgagg	gatttaccat
1798-1857	aactccggga	gatgaagcgt	gtataatgtc	aggcttaaac	cgtgcaattt	cagagatgat
1858-1917	tcttggaacta	agcgcaagcg	agagtggaaac	cttttggtaa	taaggacaag	ggaagctaca
1918-1977	gaagagaaga	agaaattagc	gatattacca	aatagagaac	atccagtga	taaactaaat
1978-2037	ggtgctacct	tcttgatcca	atgactctgg	ctccataaaa	ctcttcagga	acaccttcat
2038-2097	gtgtcgtcac	gactataaacc	tatgaagcaa	aaaagttatt	aaaaaaaaaa	aaaaaggaac
2098-2157	agttaacact	tgtcaagtaa	ttctaattct	ggaaacagtt	acttatgagc	tgactgaaaa
2158-2217	gatacttaag	ttgaagaatg	agatagtaaa	agaagaaacc	tcgtctccca	tttcacggag
2218-2277	gtatctaattg	aaattctgga	atctgttttt	gtagccggat	acatagctgc	aacaaaaatca
2278-2337	aagagagaat	cacttccaat	aataacatga	catataataa	aagcttttgg	tcaatggatc
2338-2397	ggtgattccg	agaatcttgg	gatattcaca	actaaaatct	gacaactttg	actcaaacaa
2398-2457	atcctgaatg	taattggttt	taacgatcta	ctatataatt	tgctaaattg	gtggtgtagc
2458-2517	aaattcatac	attagcgagt	atctcttcat	aaaataaatg	taacgatcaa	atcgaaagaa
2518-2577	aaaaacatta	caggaaaaag	tcaaccaagg	aaaaaaatga	gtagaatctg	ttttcacaga
2578-2637	gacatttcgt	cgaacacaaa	acaagcaaaa	aaagaacact	gtgaagaaga	cttacgcaaa
2638-2697	gggagaaggc	tcaacaaaga	gagcaattct	cctaggctta	gagagcgact	caggatcgag
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2818-2877	aatgggtaat	ctccggtgac	caaacgaaag	aggggaatga	agaacaaaag	aagaagacct
2878-2937	gggaggagaa	caagaggttg	cagaggaaga	agaacaagtg	ttagtcgtgc	taggaagcaa
2938-2979	atgaggaggt	atagagagat	ttatagaaga	aagagtcgtc	at	

003071-02050260

Figure 12

AtSQDX-2

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51-110	tcttcttccc	atcaaaaagt	gctagtggca	agaccgcgca	tattccagta
111-170	aattcaaaac	tatggaacac	aatttgtccc	atgttttggt	gcctgaatta
171-230	tcacttgggt	cggccacttc	atctcggata	cgcacaagcg	gttgtcaagg
231-290	cgattttgta	aggatctaca	ttggcaaagg	gagctttaca	gacgacttga
291-350	tgtgaagatt	gaaaggtaaa	acttttggtt	ctttgcactc	ggtgaaccaa
351-410	catctagata	cacagggtgcg	gggtaagcag	caatccgata	aggagcagcg
411-470	acctccaagc	attggtacta	aagtcgaaaa	cttcgcatgt	agtagcgttt
471-530	tttctgcaga	gttgtataac	caaacgggct	tgtatgtgcc	cctgaatttg
531-590	atccaagcat	aaagaatttg	cgtttaagct	tgtagtaacc	atctcgtaag
591-650	gtttttgata	atcgcaaaga	ggaagaggcc	gataccatct	agtggtcggg
651-710	aaccggattt	gtcgtgattg	taaagacaaa	cgagaccgtc	acaactacta
711-770	agtacagtac	gttatccttc	tcccaaggag	tagggatctt	gaacgttgat
771-830	actgcaatgt	tcttaaagat	tctatggtcg	ggtttataac	atggtgagga
831-890	ccatcagaac	atctggatct	cctgattgct	gacgatgttt	caactaaaat
891-950	tttattttat	taaaaagata	aatatcattt	tgttggaatt	ggaaaacaaa
951-1010	taactttaga	tatgtaaggg	tcgcatatgt	atttgattac	attgctatga
1011-1070	cacttttcca	ataatgaaaa	aaataaagat	gttgagtctt	actaattaag
1071-1130	aaatttctga	tcattaatac	aaagaaaaag	cctctcataa	gccaaagcca
1131-1190	cgtaaacatc	tccgcagcat	actctttaca	cttcttctct	ctctccgcca
1191-1250	tccttcagcc	acagcaacct	ccataaccgc	cgtcaaagct	tccacatttg
1251-1310	aaacccaaac	tcatcattca	ccactatagt	cctctttatg	cttgcgtaac
1311-1370	cactgggttta	ccactcaaca	tcgcttccat	taacgttaaa	tcaagacctt
1371-1430	cgttggattc	acgaacaaat	cgatcccgtt	gtagaaaccc	ttgagctcat
1431-1490	agatcccaaa	atggaaactt	tttcccctaa	ttccttgtaa	cgttgctccc
1491-1550	tccagctact	acgaggtaaa	catttgaata	cgtttggtat	attttcgcga
1551-1610	gagcaatgga	tgtcctttgt	ctttgactaa	tctcccagca	gctcctaaaa
1611-1670	tgagttttct	ggtaacccta	attttgacct	aaacagagta	cgtagcttct
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1791-1850	gaagaatctg	atttcgtcca	gtatcttggg	aagcacggca	ccgtatagac
1851-1910	gccttgtgat	cttggttcgt	ctgggtttacg	gatcaggtct	tggtaaatac
1911-1970	gctctctaac	gcaatgccgt	gccaggatac	agcgagggtt	ggaacctccc
1971-2030	gtgaggtaaa	gcaacacttt	cagagtgaac	cgcacgaaa	ggttctttct
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2271-2330	gaaaacagcg	agtttttagtg	ttttggggagg	agggttggtt	aaggagaaat
2331-2390	ccaggcaa	tgggcggttt	ggaggtcgcc	agaccacggt	ggctgggttg
2391-2450	ggaggaggag	actgcagcgg	tggaggagga	gcaagtggag	gtgcggagga
2451-2510	cggtatggta	aagaggacgg	tgaagaagag	gaaagtacaa	aggctaaaat
2511-2537	tttcttgagt	ttgggttggtg	aagccat		

Figure 13

AtSQDX-3

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8-67	ctcatgcatt	tgaccagaac	atcgacgaat	cgcttgtaca	tatgttgctt	catgtacatt
68-127	ttctcaacca	ttttgcgtcc	ttcactcccc	aatcgtagcc	tctcgtctgg	attcctaagt
128-187	agatacaaga	gattatgagc	taattctttg	ttaccggatc	tccccattga	gtgaagtaga
188-247	ccagtcattgt	tgtgttgaa	catctctttg	gttctctctg	catctgttcc	caccactgca
248-307	agtccataag	ccattgcttc	gattgtcact	ctaccaaata	tttcaccaac	tccttgtaaa
308-367	aaatcaaggt	tcaaaaataa	taaaccgaac	aaaatcgaaa	tggtcaaacc	gaaatcaaaa
368-427	cctacatfff	gaacaaaaac	aaaactgaaa	tggttttatcc	aaaaccaaac	tgaaatcaat
428-487	cacaaattgg	tttatttgat	tcagtaattc	aagttcctat	aaaactgata	aaactaaacc
488-547	aaaacctaac	tgtaaaactac	tttctagtgg	aaaactgcat	atgcatcaaa	taatgttttt
548-607	gaggtgtgag	gaggattacc	tgggagtttg	taacgtagac	atctgctgca	gagtataatg
608-667	aagcaacacg	ggttgttgca	ggagtccaca	ttaccgactt	agataagttt	ccgctgtttg
668-727	acaagaagct	taacatctct	ttaacgtatc	caactttggt	gctctttgaa	cccacggatc
728-787	ctaaaagaac	tttaagttct	tgcttctctc	ttcttaagcc	attgtcaagt	gtgagagaaa
788-847	cacttttcat	ctgtcgtgat	gaacctctta	aacgatgttt	gctggagaga	ctaacctttt
848-907	ctttccta	gatccccttg	tgattccttt	gagattcctg	tcctctctca	gaaagagcca
908-967	aggcaataga	ttcaaggaga	agaagttgtc	cctttgttgg	gtttatgctg	ctaagagaca
968-1027	tcacaagcat	atctgaatct	gttattccta	actctgttct	cactgattcg	cgtaatattt
1028-1087	gtctcttcac	cctcattttc	tctggtgaaa	gtgttggtgt	gttgagtga	gaaggaatcc
1088-1147	ccgctacaaa	agctaactca	tcattaacag	atagtggaa	aatcactggg	tgtgatctaa
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1208-1267	aaatcagcat	tttactcgg	tcaagaactg	gtttcgctcg	atcaaagtat	tctcgtcgat
1268-1327	tctccattat	ccaccaagct	atttgacttc	caccagctgg	atgatgatcc	atgtattgat
1328-1387	ctgagagaaa	aggaaaaaaa	aaaagtaatt	aagatatgct	ttcctctgat	tgtaaattag
1388-1447	tagtctaaaa	actgcataat	gaattcttac	ctatccatga	ggtacacact	gctgatcctg
1448-1507	cgatgatcaa	atctgctttc	atggcagtct	tgaagctgag	ttctcctttg	tcttcaacaa
1508-1567	ctttgatcct	tctcctactg	agctcttgca	tcaatccacc	tctcctgcta	agaactactg
1568-1627	cagagactgt	tgcaccacag	ctcaaaagct	ctgaagccag	ctccatcata	gaaattggag
1628-1687	caccagtc	tgatagctcg	tggaaaagca	ggacgaatct	ccttgaccaa	acaaggcgtt
1688-1747	taaaatctga	tttctgtctg	caagtcaccg	atcttctatg	cgggctccat	tcaagaactt
1748-1807	tatcctctag	tgatccaaag	ggaccaagaa	gcttaccata	agtagcattt	gtcaatggaa
1808-1867	gttgtggatc	ttgctcatca	tccaaatcct	tagtctcaag	tacctcttta	atcaccttct
1868-1927	gcttaacacg	gatcttacta	cgagaagtcc	ggacagtfff	tctcgtcttc	tgcttggaac
1928-1987	tcaagctccg	tcgagaaacc	ccatcatctt	tcttgatcag	actaacatcc	gtcctcttat
1988-2047	tcgaaccagc	atcatcttta	ccagtaatat	taaccaaagc	ctcagaattc	tcattagcaa
2048-2107	caacatccag	tcctttaatc	ttctccatat	ataactcatc	ctttctcggt	ctgcctccaa
2108-2167	accgtaaaaa	ctcaactttg	ctttcattat	catgtgcca	cctagactga	acataaaaatc
2168-2227	caagatacgt	ccaaagcgta	atcaaaagca	gccataaac	caaccggcta	ctacgaaacc
2228-2287	actgaaacgc	tcctcctcca	ccatgacctc	tacgcggagt	cctaccagaa	tacactctag
2288-2347	gtgtaccct	tggagtagac	ctccctgaca	gtgaagactt	aacacttgtc	tgtctcagcg
2348-2369	gcgataaccg	aatctcctcc	at			

Figure 14

SQD1

09709020.110800

```
1 gtcgacccac gcgctccgctc atctctcatc gttccgggag aagagaagag agacccatcc
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121 aattttcaaa ggtgaatttg tttgatagaa tcaagaacaa acctttaaaa tggcgcatct
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241 taagccgttt gtttcagggc agaccttctt caatgctcag cttctttcaa gatcttctct
301 caaaggactt ctcttccaag agaagaaacc gagaaaaagc tgcgttttca gagcaactgc
361 tgtacctata acccaacaag caccacccga aacatctacc aataactcat cctctaaacc
421 aaagcgtgtt atggtcattg gtggagatgg ttattgctgg tgggctactg ctctccactt
481 gtccaagaag aattacgaag tttgcattgt tgacaacctt gtaagacgtc ttttcgacca
541 ccagcttgga cttgagtcac tgactcctat tgcctccatt catgaccgaa tcagccgatg
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661 cttagctgag tctttcaagt cttttgagcc ggattcagtt gtccactttg gggaaacagag
721 atccgctcct tactcgatga ttgaccggtc cagagcagtt tatacacagc acaacaatgt
781 gattgggact ctcaacgttc tctttgctat aaaagagttt ggagaggagt gtcattctgt
841 aaaacttggg acgatgggtg agtatggaac tccaaatatt gacatcgagg aagggtatat
901 aaccataacc cacaacggta gaactgacac tttgccatac cccaagcaag ctagctcctt
961 ttatcatctt agcaaagttc atgattcgca caacattgct tttacttgca aggcctgggg
1021 tattagagcc actgatctca accaaggagt tgtttatgga gtgaagactg atgagacaga
1081 gatgcatgag gaactccgta accgactgga ttacgatgct gtgtttggta cagcacttaa
1141 ccggttctgt gtgcaagctg ctggttggtc cccacttaca gtttatggta aagggtggtc
1201 gacgagaggc tacctcgata taagagacac gggtcaatgt gttgagatcg ctatagcaaa
1261 cccggcaaaa gctgggtgag tccgggtctt caaccaattt acagaacagt tttcagtcaa
1321 tgaactggct tcaactcgta ctaaagcggg ttcaaagctt gggctagacg tgaaaaagat
1381 gacggtgcct aacccgagag tggaggcaga agaacattac tacaacgcaa agcacactaa
1441 gctgatggaa cttggacttg agcctcacta tctatctgac tcaacttcttg attcggttgc
1501 caactttgct gttcagttta aagatcgtgt ggacacgaaa caaatcatgc ctagtggttc
1561 ctggaagaag attggcgtca agactaagtc catgaccaca taaagtgcag accaatatta
1621 cacataagga gagattatga aagagatgat gtgttgtttg gtatcttcaa acttcatttc
1681 tgcaaaaagac ttgctaggct taagaggttt tgtccatatt acatttgta ggttctttaa
1741 tgttagatct taatttcgat gaaaaaaaaa aaaaaaaaaa aaaaaaaaag ggcggccgc
```

Figure 15

SQDB

1-25					gagaa	gattcttgta	ttgggtggcg
26-85	atgggtttctg	cggttgccc	tgcgtctca	atttggtgc	tgcaggtcac	gccgtcacca	
86-145	ttgttgacaa	cctcgttcgc	cgcaagacag	acgtggaatt	gggggttcag	tccctcactc	
146-205	cgatcgcgac	gattgaacgc	cggttgaagg	catggcaaga	aacgggcggg	cagccgatta	
206-265	gctttgtcaa	tctcgactta	gcggctgatt	acgatcgct	ctgtgcacta	ctgctagaaa	
266-325	cgcagccgga	tgcgatcgtg	cattttgccg	aacagcgcgc	cgccccctat	tcaatgaaga	
326-385	gtgcatggca	taagcgcttc	acggtcaata	acaacgtcaa	cgccaccac	aatctgctct	
386-445	gcgcctgtgt	ggatgtcggc	ctcaagtcct	acattgtcca	cttgggcacc	atgggcgtct	
446-505	atggatacgg	tagccatcgc	ggggctacga	ttcctgaagg	ctacttagaa	gtggaagtgc	
506-565	tccagcggga	tggccaacgc	tttgaagaga	agattcttca	cccgttgat	ccgggtagcg	
566-625	tctatcacat	gaccaagacg	ctggatcaat	tgttgttcta	ctactacaac	aagaacgaca	
626-685	acatccaagt	caccgacctt	caccagggtg	ttgtctgggg	cacgaacacc	gatcactgta	
686-745	atctccaccc	ggatctgacc	aatcggttcg	actacgacgg	tgattacggc	acagtcttga	
746-805	accgcttctt	gatgcaggcg	gcgatcggct	atcccttgac	tgtgcatggc	gttgggtggcc	
806-865	aaacccgagc	cttcatccac	attcgcgact	cagtgcgctg	cgtccaactg	gcgatcgaaa	
866-925	atccgccagc	agccaatgaa	aaagtccgca	tctttaacca	gatgacggaa	acctaccaag	
926-985	tcaaggattt	ggcagagaaa	gtggcggcat	tgaccgggtgc	tgaaatcgcc	tacctgccca	
986-1045	atccacgcaa	ggaagccctt	gagaacgact	tgattgtcga	caaccgctgc	ttgattgatt	
1046-1105	taggcctcaa	tccgaccacc	ttggacaatg	gcctgatgag	cgaagtggta	gaaattgcgc	
1106-1165	agaagtttgc	cgatcgctgc	gatcgcgcca	aaattccctg	cgtttctgcc	tggacccgta	
1166-1209	atcaagctga	agctctcagc	gctcctgaaa	ccgctctgcg	ctaa		

Figure 16

MAHLLSASCPSVISLSSSSSKNSVKPFVSGQTFNAQLLSRSSLKGLLFQEKKPRKSC
VFRATAVPITQQAPPETSTNNSSSKPKRVMVIGGDGYCGWATALHLSKKNYEVCIVDN
LVRRLFDHQLGLES LTPIASIHDRISRWKALTGKSIELYVGDICDFEFLAESFKSFEP
DSVVFHGEQRSAPYSMIDRSRAVYTQHNNVIGTLNVLFAIKEFGEECHLVKLGTMG EY
GTPNIDIEEGYITITHNGRTDTLPYPKQASSFYHLSKVHDSHNIAFTCKAWGIRATDL
NQGVVYGVKTD ETEMHEELRNRLDYDAVFGTALNRF CVQA AVGHPLTVYGKGGQTRGY
LDIRDTVQCVEIAIANPAKAGEFRVFNQFTEQFSVNELASLVTKAGSKLGLDVKKMTV
PNPRVEAEEHYNAKHTKLMELGLEPHYLSDSLDSLLNFAVQFKDRVDTKQIMPSVS
WKKIGVKT KSM TT

003077-02060260

Figure 17

MRIALFTETFLPKVDGIVTRLRHTVDHLQRLGHTVMVFCDGGLREHKGARVYGVKGF
PLPLYPELKLAFFLPKVGKALERFRPDLIHVVNPAVLGLGGIYYAKALNVPLVASYHT
HLPKYLEHYGLGVLEGVLWELLKLAHNQAAINLCTSTAMVQELTDHGIEHCCLWQRGV
DTETFRPDLATAAMRDRLSGGKPTAPLLLYVGRLSAEKQIDRLRPILDANPEACLALV
GDGPHRAELEQLFAGTQTQFIGYLHGEQLGAAYASADAFVFPSTETLGLVLEAMAA
GCPVVAANSGGIPDIVSDGINGFLFDPEDEQGAIAAIQRLLANPAEREILRQAARQEA
ERWSWNAATRQLQDYICEVLADGCLPLAA

008077" 02050250

Figure 18

MKILVLGGDGF CGWPCALNLAAAGHAVTIVDNLVRRKTDVELGVQSLTPIATIERRLK
AWQETGGQPISFVNLDLAADYDRLCALLLETQPD AIVHFAEQRAAPYSMKSAWHKRFT
VNNNVNATHNLLCACVDVGLKSHIVHLGTMGVYGYGSHRGATIPEGYLEVEVVQRDGO
RFEEKILHPVDPGSVYHMTKTLDQLLFYYYNKNDNIQVTDLHQGIVWGTNTDHCNLHP
DLTNRFDYDGDYGTVLNRFLMQAAIGYPLTVHGVGGQTRAFIHIRDSVRCVQLAIENP
PAANEKVRIFNQMTETYQVKDLAEKVAALTGAELAYLPNPRKEALENDLIVDNRCLID
LGLNPTTLDNGLMSEVVEIAQKFADRCRAKIPCVSAWTRNQAEALSAPETALR

0080TT 02060260